

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A water pump for cooling an engine in which an impeller is accommodated in a pump housing provided on an engine body wherein the impeller is mounted on an end of a rotational shaft rotatably supported on said pump housing comprising:

a fitting recess formed in said impeller for fitting an end of said rotational shaft having an outer circumferential surface which is straight in an axial direction at least a portion for engaging with said impeller, said fitting recess being formed in a substantially central portion of said impeller; ~~and~~

a bolt inserted into the substantially central portion of said impeller, said bolt being threaded in a coaxial direction with the end of said rotational shaft that is fitted in said fitting recess~~[[,]]; and~~

an engaging recess formed on a distal end of said impeller for engaging sides of a head of said bolt for positioning said bolt relative to said rotational shaft.

~~wherein a first end of said rotational shaft is connected to said impeller and a second end of said rotational shaft is connected to an oil pump.~~

2. (Canceled)

3. (Currently Amended) ~~The water pump for cooling an engine according to claim 2,~~ A water pump for cooling an engine in which an impeller is accommodated in a pump housing provided on an engine body wherein the impeller is mounted on an end of a rotational shaft rotatably supported on said pump housing comprising:

a fitting recess formed in said impeller for fitting an end of said rotational shaft having an outer circumferential surface which is straight in an axial direction at least a portion for engaging with said impeller, said fitting recess being formed in a substantially central portion of said impeller; and

a bolt inserted into the substantially central portion of said impeller, said bolt being threaded in a coaxial direction with the end of said rotational shaft that is fitted in said fitting recess; and

an engaging recess formed on a distal end of said impeller for engaging a head of said bolt for positioning said bolt relative to said rotational shaft,

wherein a first end of said rotational shaft is connected to said impeller and a second end of said rotational shaft is connected to an oil pump, and

wherein said engaging recess further tightens said bolt as said impeller is rotated.

4. (Original) The water pump for cooling an engine according to claim 1, and further including a seal mounted relative to said impeller and said rotational shaft for sealing a proximal end of said impeller relative to said rotational shaft.

5. (Canceled)

6. (Original) The water pump for cooling an engine according to claim 1, wherein a bending load is applied to the impeller and the rotational shaft and is prevented from being applied to the bolt.

7. (Currently Amended) ~~The water pump for cooling an engine according to claim 1,~~ A water pump for cooling an engine in which an impeller is accommodated in a pump housing provided on an engine body wherein the impeller is mounted on an end of a rotational shaft rotatably supported on said pump housing comprising:

a fitting recess formed in said impeller for fitting an end of said rotational shaft having an outer circumferential surface which is straight in an axial direction at least a portion for engaging with said impeller, said fitting recess being formed in a substantially central portion of said impeller; and

a bolt inserted into the substantially central portion of said impeller, said bolt being threaded in a coaxial direction with the end of said rotational shaft that is fitted in said fitting recess,

wherein a first end of said rotational shaft is connected to said impeller and a second end of said rotational shaft is connected to an oil pump, and

wherein in the central portion of said impeller, an engaging recess for fitting an enlarged diameter head portion of said bolt relatively unrotatably is provided facing opposite to said fitting recess, and the rotational direction of said rotational shaft and said impeller is set to the direction in which said bolt is further tightened by the resistance that said impeller receives from the cooling liquid within said pump housing.

8. (Currently Amended) A water pump for cooling an engine comprising:

a pump housing provided on an engine body;

an impeller accommodated within said pump housing provided on the engine body;

a rotational shaft rotatably supported on said pump housing wherein the impeller is mounted on an end of said rotational shaft;

a fitting recess formed in said impeller for fitting the end of said rotational shaft, said fitting recess being formed in substantially a central portion of said impeller; ~~and~~

a bolt inserted into the substantially central portion of said impeller, said bolt being threaded into the end of said rotational shaft that is fitted in said fitting recess[,,]; and

an engaging recess formed on a distal end of said impeller for engaging sides of a head of said bolt for positioning said bolt relative to said rotational shaft.

~~wherein a first end of said rotational shaft is connected to said impeller and a second end of said rotational shaft is connected to an oil pump.~~

9. (Canceled)

10. (Currently Amended) ~~The water pump for cooling an engine according to claim 9;~~ A water pump for cooling an engine comprising:

a pump housing provided on an engine body;

an impeller accommodated within said pump housing provided on the engine body;

a rotational shaft rotatably supported on said pump housing wherein the impeller is mounted on an end of said rotational shaft;

a fitting recess formed in said impeller for fitting the end of said rotational shaft, said fitting recess being formed in substantially a central portion of said impeller;

a bolt inserted into the substantially central portion of said impeller, said bolt being threaded into the end of said rotational shaft that is fitted in said fitting recess;
and

an engaging recess formed on a distal end of said impeller for engaging a head of said bolt for positioning said bolt relative to said rotational shaft,

wherein a first end of said rotational shaft is connected to said impeller and a second end of said rotational shaft is connected to an oil pump, and

11. (Original) The water pump for cooling an engine according to claim 8, and further including a seal mounted relative to said impeller and said rotational shaft for sealing a proximal end of said impeller relative to said rotational shaft.

12. (Canceled)

13. (Original) The water pump for cooling an engine according to claim 8, wherein a bending load is applied to the impeller and the rotational shaft and is prevented from being applied to the bolt.

14. (Currently Amended) ~~The water pump for cooling an engine according to claim 8,~~ A water pump for cooling an engine comprising:

a pump housing provided on an engine body;

an impeller accommodated within said pump housing provided on the engine body;

a rotational shaft rotatably supported on said pump housing wherein the impeller is mounted on an end of said rotational shaft;

a fitting recess formed in said impeller for fitting the end of said rotational shaft, said fitting recess being formed in substantially a central portion of said impeller; and

a bolt inserted into the substantially central portion of said impeller, said bolt being threaded into the end of said rotational shaft that is fitted in said fitting recess,

wherein a first end of said rotational shaft is connected to said impeller and a second end of said rotational shaft is connected to an oil pump, and

wherein in the substantially central portion of said impeller, an engaging recess for fitting an enlarged diameter head portion of said bolt relatively unrotatably is provided facing opposite to said fitting recess, and the rotational direction of said rotational shaft and said impeller is set to the direction in which said bolt is further tightened by the resistance that said impeller receives from the cooling liquid within said pump housing.

15. (Previously Presented) A water pump for cooling an engine comprising:

a pump housing provided on an engine body;

an impeller accommodated within said pump housing provided on the engine body;

a rotational shaft rotatably supported on said pump housing wherein the impeller is mounted on an end of said rotational shaft;

a fitting recess formed in said impeller for fitting the end of said rotational shaft, said fitting recess being formed in substantially a central portion of said impeller;

a bolt inserted into the substantially central portion of said impeller, said bolt being threaded into the end of said rotational shaft that is fitted in said fitting recess; and

a hexagonal engaging recess formed on a distal end of said impeller for engaging an enlarged diameter hexagonal head of said bolt for positioning said bolt relative to said rotational shaft such that the bolt is relatively unrotatably with respect to the impeller and thereby the bolt is further tightened by a resistance that the impeller receives from a cooling liquid within said pump housing.

16. (Previously Presented) The water pump for cooling an engine according to claim 15, and further including a seal mounted relative to said impeller and said rotational shaft for sealing a proximal end of said impeller relative to said rotational shaft.

17. (Previously Presented) The water pump for cooling an engine according to claim 15, wherein a first end of said rotational shaft is connected to said impeller and a second end of said rotational shaft is connected to an oil pump.

18. (Previously Presented) The water pump for cooling an engine according to claim 15, wherein a bending load is applied to the impeller and the rotational shaft and is prevented from being applied to the bolt.

19. (New) The water pump for cooling an engine according to claim 1, wherein a first end of said rotational shaft is connected to said impeller and a second end of said rotational shaft is connected to an oil pump.

20. (New) The water pump for cooling an engine according to claim 8, wherein a first end of said rotational shaft is connected to said impeller and a second end of said rotational shaft is connected to an oil pump.